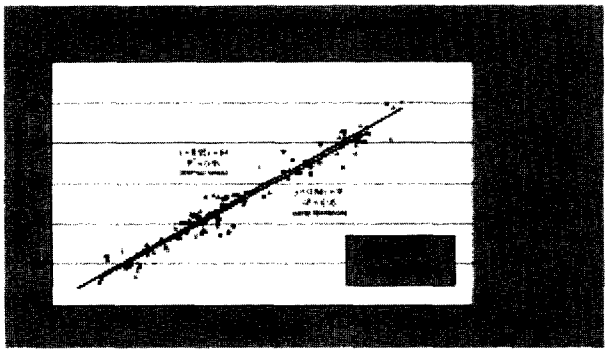
Methods: Twenty subjects (6 Afib, 4 Aflutter with variable block and 10 patients with sinus rhythm) were recruited. All subjects had conventional ECG-gated balanced FFE imaging in the mid-ventricle short axis, 4-chamber, and 2-chamber views as well as 10-beats of continuous real-time imaging in the same orientations. End-systolic and end-diastolic LV areas for the conventional and real-time (average of 10 consecutive beats) data sets were measured. **Results:** A very strong correlation exists between the conventional and real-time methods for LV areas for both sinus rhythm (r^2 = 0.95) and AF (r^2 = 0.94) subjects (figure). This relationship persists when end-systole (r^2 = 0.87, 0.87 respectively) and end-diastole (r^2 = 0.93, 0.94 respectively) are evaluated separately. However, the correlation is only modest for LV area change (diastole - systole) in both groups (r^2 = 0.6).

Conclusion: For patients with atrial fibrillation, conventional balanced FFE acquisitions compare favorably to real-time for determining LV cavity size. However, LV area change does not correlate as well which may be due to differences in temporal resolution.



1118-34 **Assessment of the 3-D Flow Pattern In the Sinuses of Valsalva**

John-Peder E. Kvitting, Tino Ebbers, Lars Wigström, Jan Engvall, Ann F. Bolger, Christian L. Olin, Linköping University, Linköping, Sweden, University of California at San Francisco, San Francisco, CA

Background:
The sinuses of Valsalva have been postulated to be important in the function of the aortic valve. The vortices formed within the sinuses have been proposed to adapt the aortic valve for early closure and improve coronary blood flow. Albeit, the function of the aortic sinuses remains largely unstudied in man.
Methods:
Using a time-resolved 3D phase contrast magnetic resonance imaging (MRI) technique blood velocity data was acquired in 6 male volunteers, mean age 34 ± 14 (range, 25-61). The velocity data was transferred to a visualization program where streamlines were generated to visualize the instantaneous flow field in systole. The aortic flow curve was obtained by extracting velocity data from a region within the aortic lumen.
Results:
Vortex formation was seen in all three aortic sinuses, but was only present at the down stroke of the aortic flow curve. Initially the vortices increase in size, and move towards each other with the closure of the aortic valve. In late systole the vortices become smaller and rotate with lower velocities. In the figure, image 1 corresponds to peak systole, and 2-4 to 90,120 and 150 ms later.

Conclusion:
In our normal volunteer data the vortices are seen being formed in late systole, as the aortic flow decelerates. These are the first 3D, non-invasive images of the flow patterns within the sinuses of Valsalva in man.

ORAL CONTRIBUTIONS

826 Advances in Echocardiography: New Tools and New Applications

Monday, March 31, 2003, 2:00 p.m.-3:30 p.m.
McCormick Place, Room S101

2:00 p.m.

826-1 **Intracardiac Echocardiographic Guidance of Transcatheter Closure of Atrial Septal Defects and Patent Foramen Ovale: Comparison With Transesophageal Echocardiography and Cine Fluoroscopy**

Qi-Ling Cao, Ziyad M. Hijazi, Peter Koenig, Mei Jin, Joel Sims, David J. Waight, Mary Heitschmidt, Roberto M. Lang, University of Chicago, Chicago, IL

Background:Intracardiac echocardiography (ICE) can provide similar anatomical views to TEE that may obviate the need for anesthesia during device closure.
Methods: 153 patients (104 female) with secundum ASD(n=109) or PFO associated with a stroke/transient ischemic attack (n=44) underwent transcatheter device closure guided by sequential TEE and ICE (Group A, n= 9) or ICE alone (Group B, n=144). The mean age of patients was 39 yr. and the mean weight was 64.3 kg. Results: Both imaging techniques provided similar views of the atrial septum, the defects and the various stages of device deployment. However, due to the proximity of the left atrium to the esophagus, the images obtained by ICE were more helpful and informative than those obtained by TEE. In group A, there was no difference in the mean size of the defect as measured by TEE compared with that measured by ICE: mean of 21.2 mm (range 14-27 mm) by TEE compared with a mean of 19.7 mm (range 14-26.2 mm) by ICE. Furthermore, there was no difference in the size of the balloon stretched diameter of the defect as measured by TEE compared with ICE: mean of 26.6 mm (range 16-38 mm) by TEE compared with a mean of 26.4 mm (range 16-35.1 mm) by ICE. Both TEE and ICE correlated very well for the measured 2-D defect diameter and the balloon stretched diameter (r=0.94 and 0.98 respectively). In group B, the mean size of defects as measured by ICE alone was 13.3 mm (range 2-36). ICE measurement of the balloon stretched diameter correlated well with cine angiography: mean of 20.4 mm (range 3-36 mm) by ICE compared with a mean of 21.5 mm (range 3.5-38 mm) by cine fluoroscopy, r=0.98. All patients had successful device placement (guided either by TEE and ICE, or ICE alone). The mean device size was 22 mm (range 5-38 mm). One thirty five patients had immediate complete closure and 18 patients had small residual shunt. There were no complications encountered during the procedure related to the use of ICE.
Conclusion: ICE provides unique images of the atrial communications and similar measurements to those obtained by TEE and cine fluoroscopy. ICE should replace TEE as a guiding imaging tool for ASD and PFO device closure, thus eliminate the need of general anesthesia.

2:15 p.m.

826-2 **Four-Dimensional Surface-Tracking of Contrast-Enhanced Transthoracic Biplane Echocardiograms: A New Tool for Quantitative Assessment of Left Ventricular Function**

Javier Bermejo, Roberto M. Lang, Rodolfo Odreman, Miguel Mulet, James Saunders, Lynn Weinert, Lissa Sugeng, Mar Moreno, Miguel A. Garcia-Fernandez, Hospital Gregorio Maranon, Madrid, Spain, University of Chicago, Chicago, IL

Objective tools for assessing LV volumes and endocardial motion are limited to 2D echocardiography. We evaluated the accuracy of quantitative measurements obtained from 4D reconstructions using a prototype harmonic bi-plane transducer (Philips). **Methods.** 12 patients with a wide-range of LV volumes were studied. Harmonic imaging during contrast infusion included 19 planes (every 10°), which were scanned sequentially from a fixed transducer position. In each plane, the endocardial border was tracked throughout the cardiac cycle using a custom-designed, semi-automatic algorithm. Endocardial surface was then rendered for all frames and visually verified by superimposing the fitted surface on the original images (**figure**). Instantaneous volumes were compared to those obtained from acoustic quantification (AQ) and to manually-traced Simpson-derived end-systolic (ES) and end-diastolic (ED) volumes. **Results:** 83% of datasets were suitable for surface tracking. Although 4D instantaneous volumes correlated highly with AQ-derived values (n= 271 measurements; $r_{intraclass}$=0.96), AQ volumes were 20% smaller. Agreement of 4D with manually-traced volumes was excellent for ES and ED volumes (r_{ic}=0.93 and 0.97; bias 13 and 3%, respectively) and EF (r_{ic}=0.76; absolute bias 10%). Accuracy of AQ-derived EF was worse (r_{ic}=0.58; absolute bias